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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/558,843	11/29/2005	Hwa Ung Lee	KCLIM47.002APC	6986
29995 7590 06/29/2009 KNOBBE MARTENS OLSON & BEAR LLP 2040 MAIN STREET FOURTEENTH FLOOR IRVINE, CA 92614				
EXAMINER GREGORIO, GUINEVER S				
ART UNIT 1793		PAPER NUMBER		
NOTIFICATION DATE 06/29/2009		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

jcartee@kmob.com  
eOAPilot@kmob.com

### Office Action Summary

**Application No.**

10/558,843

**Applicant(s)**

LEE ET AL.

**Examiner**

GUINEVER S. GREGORIO

**Art Unit**

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 April 2009.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 7-15 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 7-15 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)  
Paper No(s)/Mail Date \_\_\_\_\_  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 7-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Song et al. (Synthesis Gas Production via Dielectric Barrier Discharge Over Ni/gamma-

Al<sub>2</sub>O<sub>3</sub> Catalyst; Catalysis Today; 89, pages 27-33; 2004) in view of Eliasson et al. (U.S. Pat. No. 6,284,157 B1). Song et al. teaches methane conversion from carbon dioxide reforming of methane using dielectric barrier discharge over Ni/γ-Al<sub>2</sub>O<sub>3</sub> catalyst (paragraph 2). Although Song et al. does not teach the filling of the catalyst in the reactor, Examiner takes the position that it is obvious that the catalyst must somehow be placed in the quartz reactor where the reaction occurs. Song et al. teaches an inner electrode, and an outer electrode which was a silver paste coated on the outer wall of the quartz tube (paragraph 3, lines 5-8). Furthermore, Song et al. teaches 10 kV which corresponds with a high voltage. Song et al. further teaches the dielectric-barrier discharge reactor was connected to the power supply to generate a plasma (paragraph 3, lines 9-12). Lastly, song et al. teaches a cold trap which corresponds to a method for discharging the synthetic gas (CO, H<sub>2</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>3</sub>H<sub>8</sub>, and C<sub>4</sub>H<sub>10</sub>) (Figure 1 and Abstract). Song et al. does not teach mixing the methane and oxygen containing compound when a temperature is maintained to be 200-400 °C.

2. Eliasson et al. teaches the reaction temperature in the reaction space can be kept constant at a predeterminable temperature for example up to 350 °C by means of a heating device (column 2, lines 61-63). Although, Eliasson et al. does not teach mixing and heating the gas prior to the introduction to the reaction chamber Examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time of the invention to mix and heat the methane and carbon dioxide up to 350 °C prior to the introduction of the reaction chamber because the heated gas would (1) maintain the temperature of the reaction chamber as taught by Song et al. without additional

components and (2) by heating the gases prior to introduction into the reaction chamber the homeostasis of the reaction is not perturbed which can affect the conversion, selectivity and yield.

3. Regarding claim 8, as stated supra Song et al. teaches carbon dioxide.
4. Regarding claims 9-10 and 15, as stated supra Song et al. teaches a nickel catalyst.
5. Regarding claim 11, as stated supra Eliasson et al. teaches a temperature up to 350 °C which overlaps with 200-400 °C.
6. Regarding claim 12, first and foremost Examiner would like to state for the record the claim is unintelligible. However, Examiner takes the position that since the method recited by Song et al. is commensurate with the method recited by the applicant whatever it is that applicant is trying to claim is part of the process and therefore is obviously taught by Song et al.
7. Regarding claim 13, Song et al. teaches a silver paste coated on the outer wall of a quartz tube with a wall thickness of 1mm (paragraph 3, lines 1-8).
8. Regarding claim 14, Song et al. teaches an inlet tube mixing and introducing methane and carbon dioxide (oxygen containing compound) into the reactor (Figure 1). Song et al. teaches an inner electrode which corresponds to an internal electrode (paragraph 3, lines 5-6). Song et al. teaches a silver paste coated on the outer wall of the quartz tube which corresponds to an external electrode made of thin film of the reactor (paragraph 3, lines 6-8). Song et al. teaches methane conversion from carbon dioxide reforming of methane using dielectric barrier discharge over  $\text{Ni}/\gamma\text{Al}_2\text{O}_3$  catalyst

which corresponds to a methane reforming catalyst layer filled in the atmospheric pressure barrier discharge reactor having the quartz tube so as to induce a catalyst reaction (paragraph 2). Furthermore, Song et al. teaches methane conversion with carbon dioxide in a dielectric barrier discharge at atmospheric pressure (paragraph 1, lines 28-30). Song et al. teaches a power supply, electrical wire, and a ground (Figure 1). Song et al. teaches a cold trap which obviously corresponds to an outlet for discharging a product (synthetic gas) prepared as a reaction is completed into an exterior (Figure 1). Song et al. does not teach a heating member mounted to heat the catalyst layer only.

9. Eliasson et al. teaches a heating device to keep the reaction space constant (column2, lines 60-63). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a heating member mounted only to the catalyst because catalytic reactions are sensitive to environmental parameters such as temperature and therefore for the sake of high yield and optimal parameters it would be prudent and obvious to one of ordinary skill in the art to maintain the temperature of the catalyst at the known optimal temperature for the catalyst.

#### ***Response to Arguments***

10. Applicant's arguments filed 04/09/2009 have been fully considered but they are not persuasive.

11. Applicant argues that claim 7 "provides surprising advantageous results by utilizing a quartz tube, a metal film outer electrode, and reacting the methane and oxygen containing compound under the influence of a heating element of about 200 to

400 °C." Examiner is not persuaded that applicant's claimed invention is patentably distinct from the prior art cited because, as stated supra, Song et al. teaches an inner electrode, and an outer electrode which was a silver paste coated on the outer wall of the quartz tube which corresponds to a quartz tube and a metal film outer electrode (paragraph 3, lines 5-8). As stated by Examiner in the previous office action Eliasson et al. teaches the reaction temperature in the reaction space can be kept constant at a predeterminable temperature for example up to 350 °C by means of a heating device (column 2, lines 61-63). Although, Eliasson et al. does not teach mixing and heating the gas prior to the introduction to the reaction chamber Examiner takes the position that it would have been obvious to one of ordinary skill in the art at the time of the invention to mix and heat the methane and carbon dioxide up to 350 °C prior to the introduction of the reaction chamber because the heated gas would (1) maintain the temperature of the reaction chamber as taught by Song et al. without additional components and (2) by heating the gases prior to introduction into the reaction chamber the homeostasis of the reaction is not perturbed which can affect the conversion, selectivity and yield. Examiner believes the reason to combine is reasonable and that one of ordinary skill in the art would obviously learn from Eliasson the improvement caused to the reaction by maintaining the reaction temperature.

12. Applicant then argues that obvious differences exist between applicant's claimed invention and the prior art cited based on the data submitted by applicant and the data provided by Song et al. Examiner is not persuaded. First applicant is arguing differences which are not claimed. Second, Examiner is not persuaded because Song

et al. teaches the same catalyst and the same structure for the apparatus, i.e. a quartz tube and metal film outer electrode and therefore are not patentably distinct.

Furthermore, Song et al. teaches various parameters which affect selectivity and conversion such as the nickel content of the catalyst, or gas flow rate while applicant's table teaches varying temperature (Table 3, Figure 4). In other words, the tables cited by applicant in Song et al. are comparing different parameters, i.e. change in nickel content vs. change in reaction temperature. Therefore because the tables are not a direct comparison of the applicant's claimed method and the prior art Examiner is not persuaded. Furthermore, Examiner takes the position that varying the temperature to optimize the conversion rate and selectivity of a reaction would be obvious to one of ordinary skill in the art.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of



the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GUINEVER S. GREGORIO whose telephone number is (571)270-5827. The examiner can normally be reached on Monday-Thursday, 10:30-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curt Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Gsg  
June 20, 2009

/Melvin Curtis Mayes/  
Supervisory Patent Examiner, Art Unit 1793